CBT 450

Diabetic Emergencies

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FOREWORD

Diabetes mellitus is a common medical condition affecting 6% of Americans younger than 50 years and 10-15% of those older than 50 years. In addition, it has been estimated that an equal number may have diabetes still undiagnosed.

Diabetes is a chronic disease caused by the lack of insulin, which is needed to regulate blood sugar. Diabetic patients who are hypoglycemic (low blood sugar) or hyperglycemic (high blood sugar) may develop life-threatening problems, which can lead to decreased level of consciousness, coma, and death.

The EMS provider needs must recognize the signs and symptoms of various diabetic emergencies. Determine if the patient is sick or not sick, deliver the proper care, and make correct destination decisions when indicated.

GOALS & OBJECTIVES

Goals

- Early recognition of the ill diabetic patient
- Meaningful intervention by proper assessment, administration of glucose, if indicated and evaluation for ALS indicators
- Safe, rapid transport to the closest appropriate medical facility when indicated

Objectives

- Psychomotor

  Given a partner, relevant equipment, and a patient with a diabetic emergency, the EMT will demonstrate proper treatment as specified in the King County EMS BLS Patient Care Guidelines.

- Cognitive

  After studying the CBT 450 Diabetic Emergencies module, the EMT will verify cognitive learning by successfully passing a written test by achieving a minimum score of 70%.

Hypoglycemia/Insulin Shock

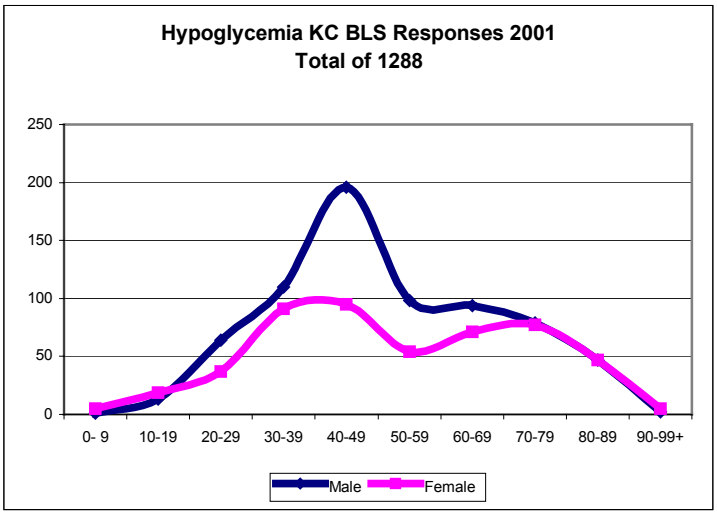


Figure 450.1
Sex and gender distribution of 1288 patients seen during 2001 and thought to have hypoglycemia by BLS providers. This occurred most often in younger middle aged men.

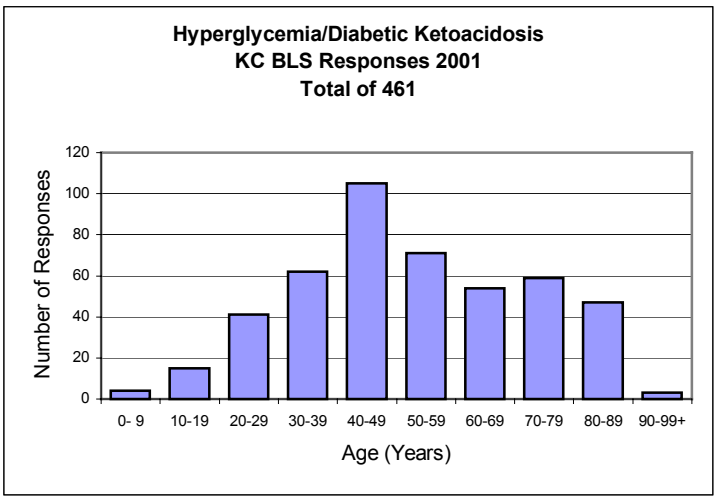


Figure 450.2
Age distribution of 461 patients seen by EMTs in 2002 for **hyperglycemia** or ketoacidosis. These patients tended to by young, middle aged.

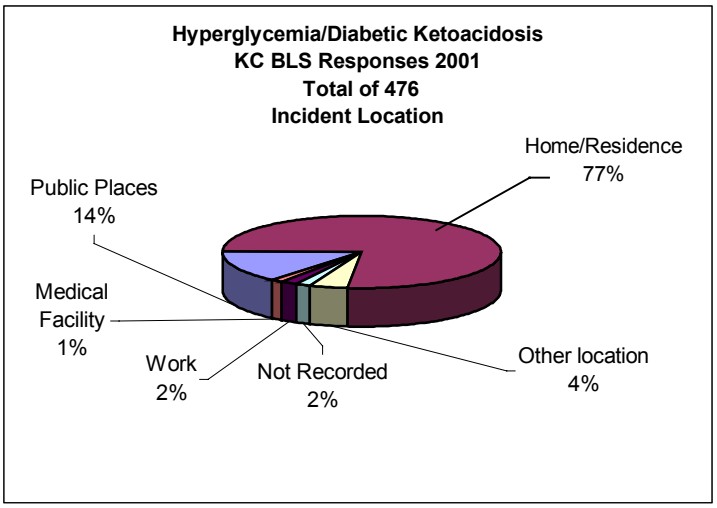


Figure 450.3
Location of patients with hyper-glycemia seen by EMTs in 2001. Most were found in their place of residence.

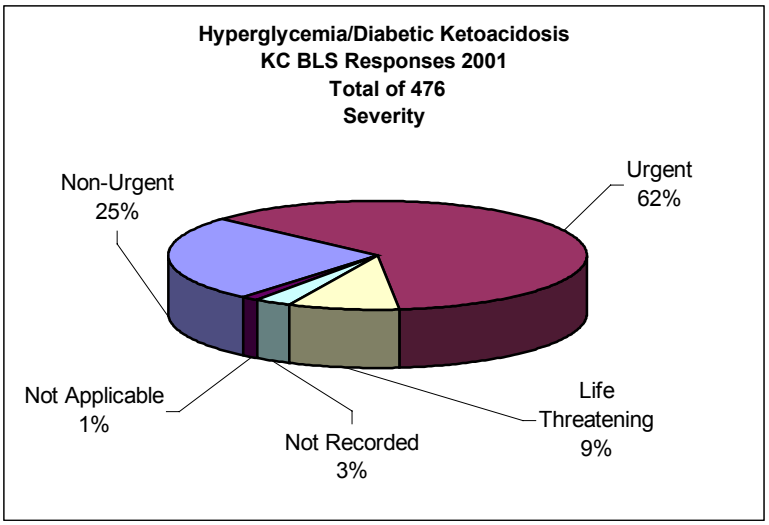


Figure 450.4
Severity of condition in hyperglycemic patients seen by EMTs in 2001. About 10% were deemed to have a life threatening condition. It is presumed that these patients had finding of diabetic ketoacidosis.

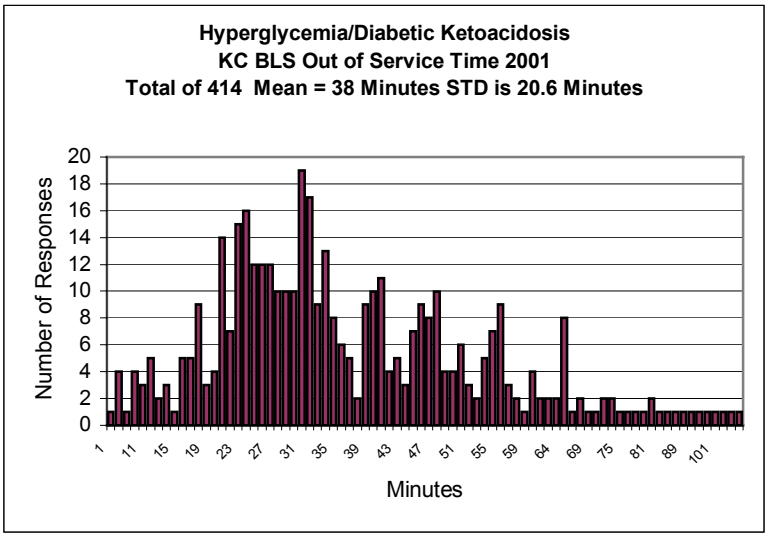


Figure 450.5
Out of service times for calls to patients with hyperglycemia in 2002. The wide variety of times probably reflects the need for BLS transport.

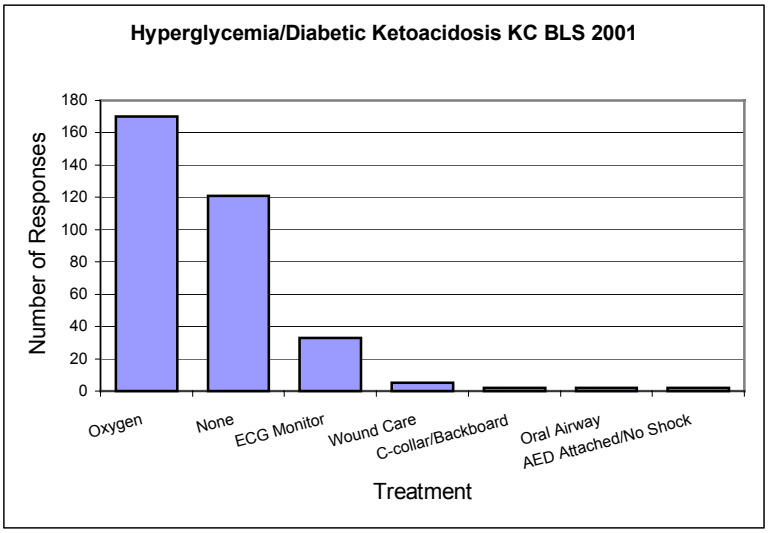


Figure 450.6
Treatments provided by EMTs in hyperglycemic patients. Most received oxygen therapy. In isolated hyperglycemia ECG monitoring would add little to patient care.

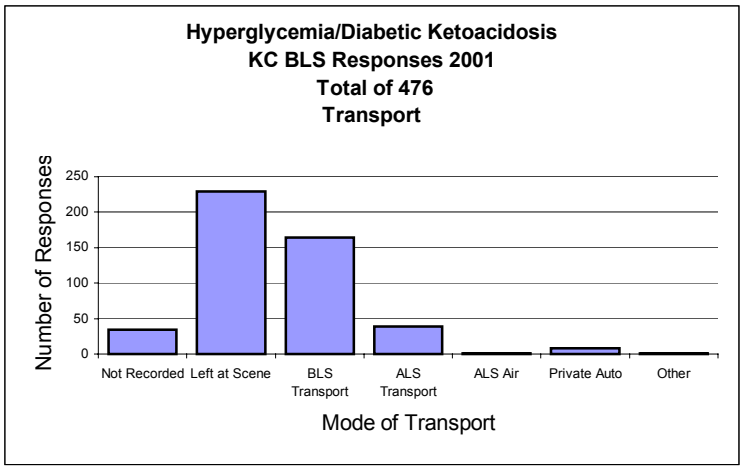


Figure 450.7
Disposition of patients with hyperglycemia. Many were left at the scene to pursue further care in consultation with their physician. A small % required ALS transport, it is assumed that these patients had symptoms of DKA.

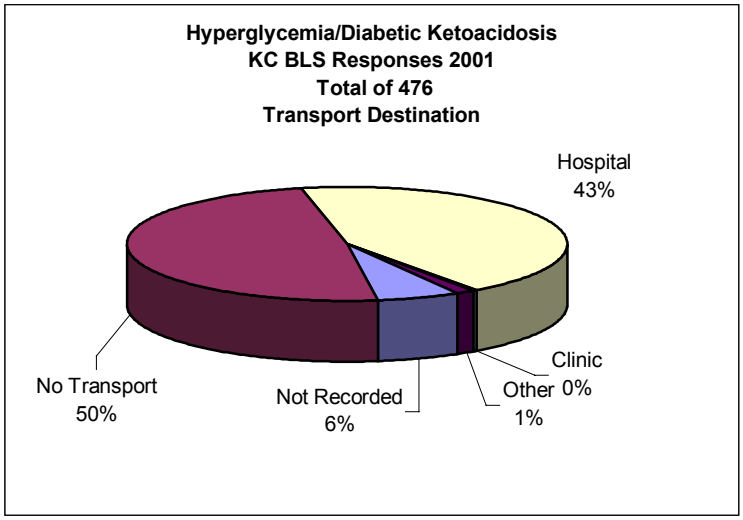


Figure 450.8
Destination of patients with hyperglycemia. Most were left at scene.

Hyperglycemia/Diabetic Ketoacidosis

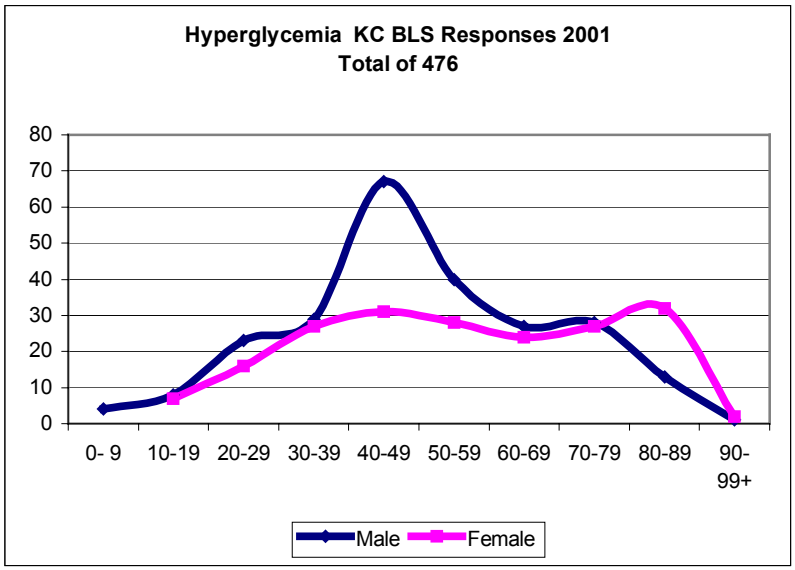


Figure 450.9
Age distribution of 1461 patients found to have hypoglycemia by EMTs in 2001. These patients are most frequently in their 40s.

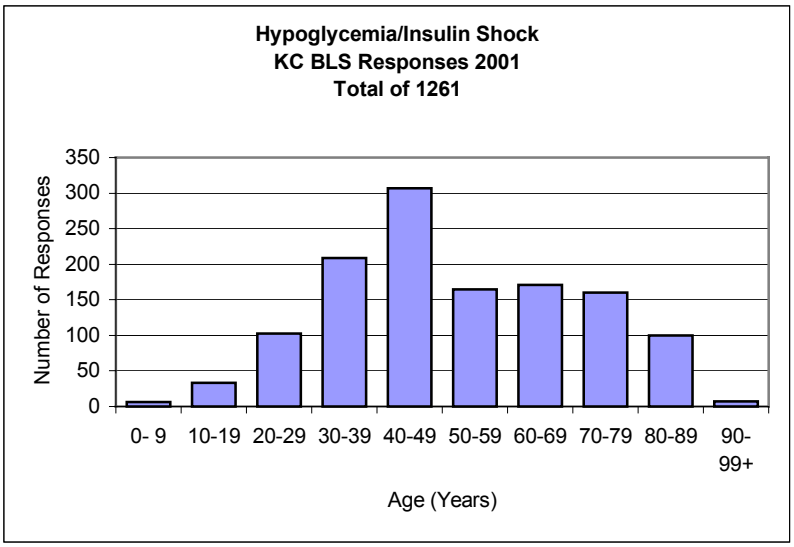


Figure 450.10
Age distribution of 1461 patients found to have hypoglycemia by EMTs in 2001. These patients are most frequently in their 40s.

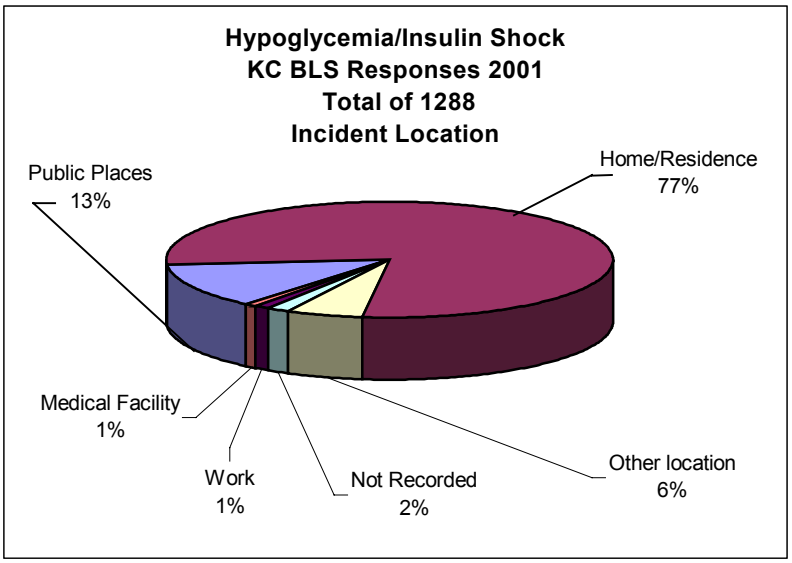


Figure 450.11
Hypoglycemia most frequently occurs at the patients' place of residence.

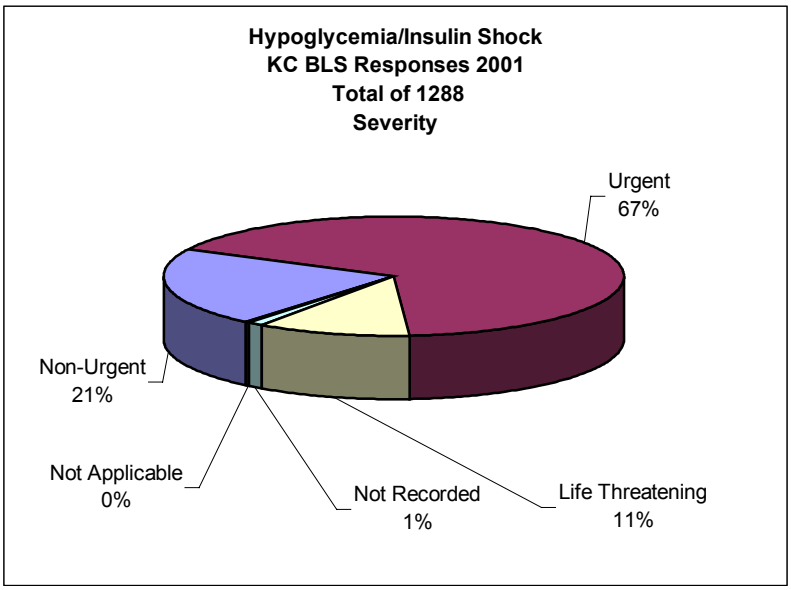


Figure 450.12
Estimation of severity by EMTs found that only 11% of patients with hypoglycemia were felt to have a life-threatening condition.
It is assumed that these patients had reduced level of consciousness and an impaired gag-swallow reflex.

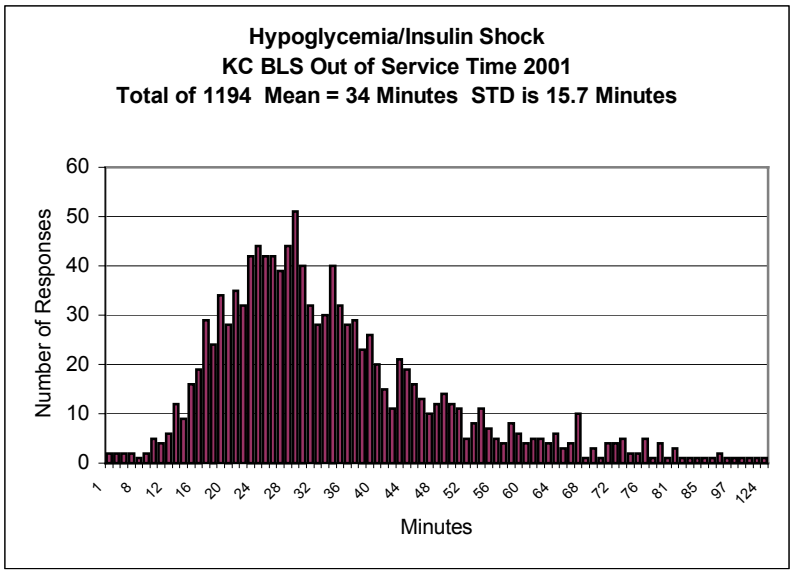


Figure 450.13
Out of service times for patients with hypoglycemia reflect the time taken to assist patients with ingestion of sugar.

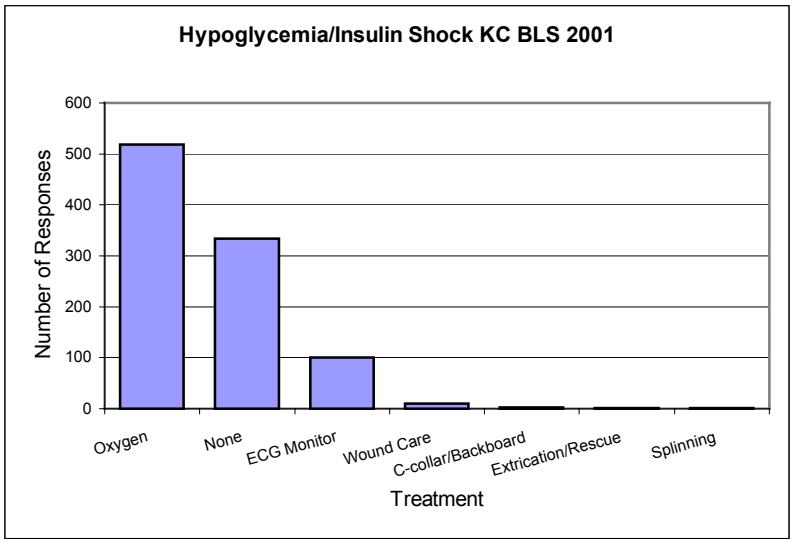


Figure 450.14
Treatments provided by EMTs include oxygen in the majority. No information about assisting with glucose ingestion is reported because that variable is not coded.

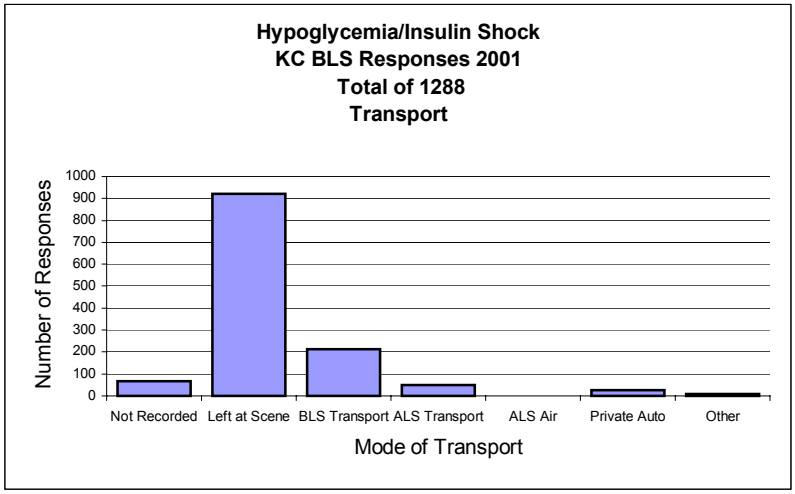


Figure 450.15
In hypoglycemia the largest number are left at scene, presumably after a favorable response to oral glucose.

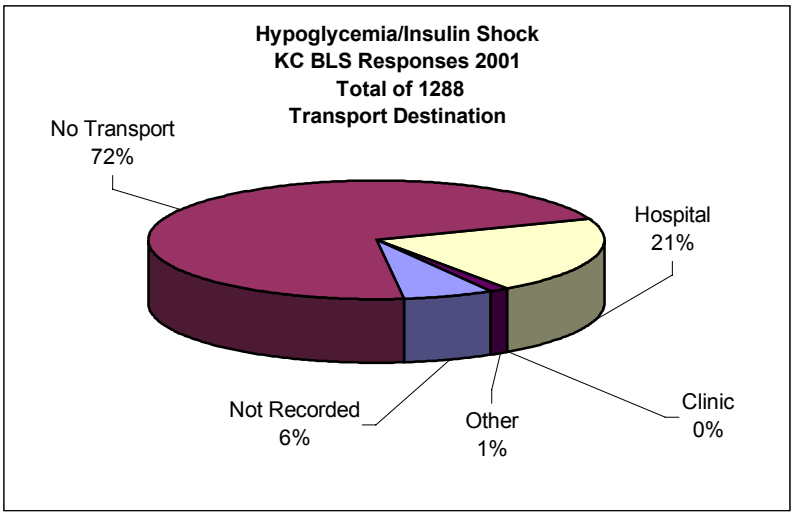
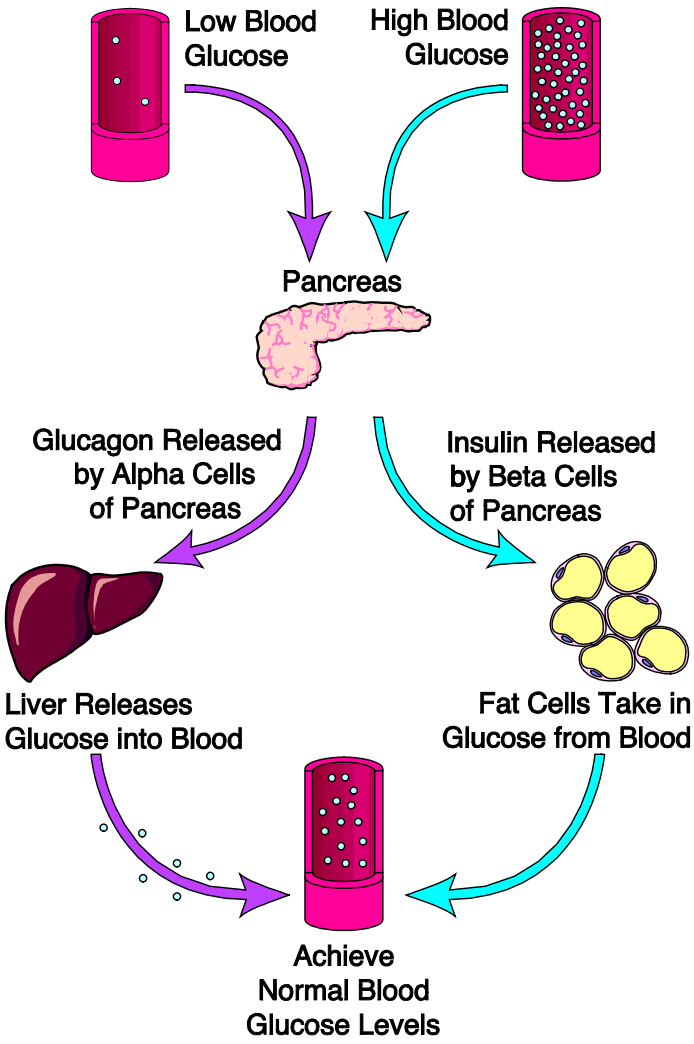


Figure 450.16
A small number of hypoglycemic patients, 21% were felt to require evaluation at an emergency room.

MEDICAL TERMINOLOGY

Diabetes Mellitus	A metabolic disorder in which the ability to metabolize carbohydrates (sugars) is impaired, usually because of a lack of insulin or interference with the effects of insulin.
Diabetes Type I	Known as *juvenile onset* diabetes. The body makes little or no insulin, and daily injections of insulin are required to live.
Diabetes Type II	Adult onset diabetes.
Glucose	D-glucose or dextrose; one of the basic sugars; it is the primary fuel, along with oxygen, for cellular metabolism.
Insulin	A hormone produced by the pancreas that enables sugar in the blood to enter the cells of the body; used in synthetic form to treat and control diabetes mellitus.
Ketoacidosis	Acidosis from uncontrolled diabetes in which an accumulation of certain acids occurs when insulin is not available. Severe metabolic abnormalities occur in Diabetic Ketoacidosis (DKA) and may result in coma.
Kussmaul respirations	Deep rapid respirations.
Hypoglycemia	Condition characterized by an abnormally decreased glucose level in the blood. May present with minor symptoms but progress to loss of consciousness. May result in brain cell injury. Rapidly reversed by sugar ingestion or injection.
Hyperglycemia	Abnormally increased glucose level in the blood.
Polyuria	The passage of an unusually large volume of urine in a given period.
Polyphagia	Excessive eating; in diabetes, the inability to use glucose properly can cause a sense of hunger.
Polydipsia	Excessive thirst persisting for long periods of time despite reasonable fluid intake; often the result of excessive urination.



The Role of Glucose and Insulin

Glucose is the major source of energy for the body and all the cells need it to function properly. Some cells will not function at all without glucose. A constant supply of glucose is as important to the brain as oxygen is. Without glucose, brain cells rapidly suffer permanent damage. Insulin is formed in special beta cells in the Islets of Langerhans located in the pancreas. Approximately 1 million beta cells are present at birth and no more can be produced. Insulin circulates throughout the body and interacts with all the body cells to allow the entry of glucose into the cells and the entry of glucose into cellular metabolism. Every cell except brain cells needs insulin to break down glucose. The brain is able to break down the glucose on its own.

CLINICAL SYNDROMES

The disease **diabetes mellitus** is marked by inadequate insulin activity in the body. Insulin is critical to maintaining normal blood glucose levels. Glucose is important for all cells, especially for brain cells.

Diabetes mellitus, or sugar diabetes, is not only a serious disease but also a common and ancient one. The disease was named in ancient times by Greek physicians who noted that affected persons produced large volumes of urine that attracted bees and other insects, hence diabetes (meaning "to pass") for excessive urine production and mellitus (meaning "honey sweet") for the presence of sugar in the urine.

There are two major types of diabetes:

- Type I (Insulin dependent)
- Type II (Non-Insulin dependent)

Type I diabetes mellitus is characterized by very low production of insulin by the pancreas. In many cases, no insulin is produced at all. Type I diabetes is commonly called juvenile or insulin dependent diabetes mellitus. Patients require regular insulin injections to maintain glucose homeostasis. This type of diabetes is less common than is Type II diabetes, but it is more serious

In untreated Type I diabetes, blood glucose levels rise because, without adequate insulin, cells cannot take up the circulating sugar. Hyperglycemia in the range of 300 to 500 mg/dL is not uncommon.

Overall, this pathophysiology accounts for the constant thirst (polydipsia), excessive urination (polyuria), ravenous appetite (polyphagia), weakness, and weight loss associated with untreated Type I diabetes.

Type II diabetes mellitus. Type II diabetes mellitus is associated with a moderate decline in insulin production accompanied by a markedly deficient response to the insulin that is present in the body. Type II diabetes is also called adult-onset diabetes or non-insulin-dependent diabetes mellitus.

Like Type I heredity may also play a role in predisposition to Type II diabetes. In addition, obese persons are more likely to develop Type II diabetes. This type of diabetes is far more common than is Type I diabetes, accounting for about 90 percent of cases of diabetes mellitus. The complications of diabetes; vascular disease, eye disease, and kidney disease occur with high frequency in both types.

Untreated Type II diabetes typically presents with a lower level of hyperglycemia but infrequently with DKA.

Medical treatment of Type II diabetes begins with diet, weight reduction and increased exercise. If nonpharmacological therapy is insufficient to bring blood glucose levels down to the normal range, oral hypoglycemic agent may be prescribed.

Gestational diabetes is a type of adult onset diabetes that begins or is first recognized during pregnancy. It usually becomes apparent in the 24^{th} to 28^{th} weeks of pregnancy. In many cases, the blood glucose level returns to normal after delivery. The symptoms are usually mild and not life-threatening to the pregnant woman. However, the increased maternal glucose levels are associated with an increased rate of prenatal complications, including birth trauma, hypoglycemia, and jaundice. Rarely, late intrauterine fetal death occurs. Maintaining control of blood glucose levels significantly reduces the risk to the

offspring. The risk factors for gestational diabetes are; maternal age of more than 25; a family history of diabetes; obesity; a previous birth of an 9 pound or larger baby; an unexplained death of a previous infant or newborn.

Women diagnosed with gestational diabetes have an increased risk of developing diabetes mellitus in the future.

Diabetic Ketoacidosis (DKA) is a state of inadequate insulin levels resulting in an accumulation of acid and ketones in the blood. It is also common in DKA to have high blood sugar, severe dehydration, and a significant alteration of the body's blood chemistry.

DKA is primarily seen in people who have Type I diabetes. Most often these are diabetics younger than 19 years, but the condition may occur in diabetics of any age. Male and females are equally affected. DKA occurs when the body has no insulin.

In DKA the body shifts from its normal metabolism using carbohydrates for fuel to a fasting state using fat for fuel. The resulting increase in blood sugar causes increased urination, dehydration, extreme thirst, Kussmaul respirations, increased heart rate, warm dry skin, decreased blood pressure and sometimes a distinctive fruity odor on the breath.

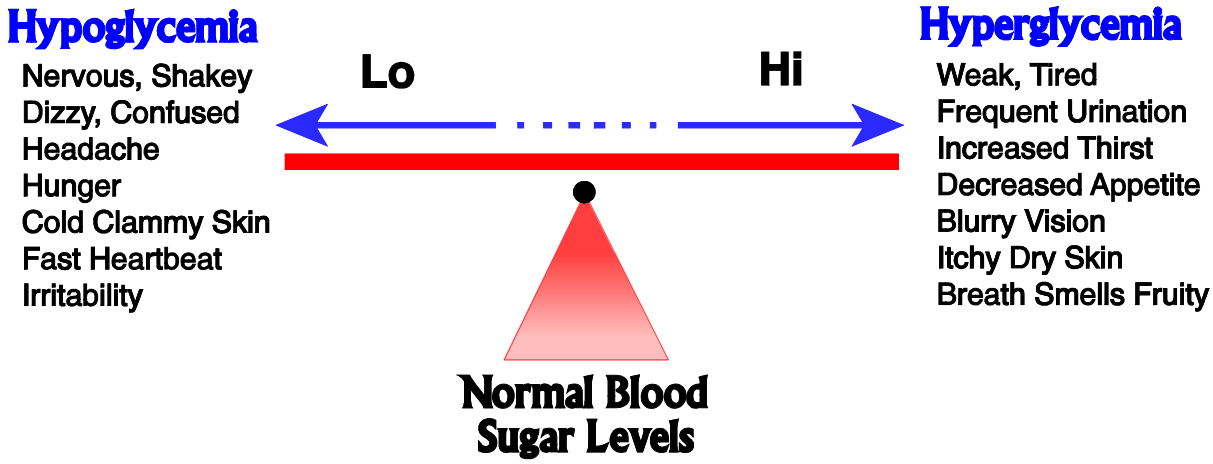
The most common events that cause persons with diabetes to enter a state of DKA are:

- Infection (40%)
- Missed insulin (25%)
- Newly diagnosed or previously unknown diabetes (15%)

Various other causes may include a heart attack, stroke, trauma, stress, and surgery. There is no identifiable cause between 20-30% of the time.

Common Complications of Diabetes

- Hypoglycemia The most common complication seen by BLS.
- Coronary artery disease with myocardial infarction, often with non-classical presentations
- Cerebrovascular disease with Stroke
- Eye disease
- Kidney disease leading to kidney failure
- Peripheral neuropathy
- Peripheral vascular disease foot ulcers, gangrene and amputation of limbs.



Characteristics of Diabetic Emergencies

	Hyperglycemia	Hypoglycemia
History		
Food intake	Excessive	Insufficient
Insulin dosage	Insufficient	Excessive
Onset	Gradual	Rapid, within minutes
Skin	Warm & dry	Pale & moist
Infection	Common	Uncommon
Activity level	Normal	Normal → excessive
Gastrointestinal Tract		
Thirst	Intense	Absent
Hunger	Absent	Intense
Vomiting	Common	Uncommon
Respiratory System		
Breathing	Air hunger	Normal or rapid
Odor of breath	Sweet, fruity	Normal
Cardiovascular System		
Blood pressure	Low	Normal
Pulse	Rapid, weak	Normal or rapid & full
Circulation	Reduced in extremities	Normal to flushed
Nervous System		
Headache	Absent	Present
Consciousness	Restless to **coma**	Irritability, confusion, seizures, or coma
Urine		
Frequency	Excessive	Normal
Amount	Excessive	Normal
Glucose	Present	Absent
Response to Treatment	Gradual, within 6 to 12 hours following medication & fluid	Immediately after glucose

THE EMT AS A HEALTH ADVOCATE

In King County there are nearly 4000 EMS field providers. These personnel can provide a large and vital force to improve the health of King County citizens.

- EMTs should learn diabetes risk factors.
  Diabetes risk factors include:
  - Obesity
  - Sedentary life style
  - Age
  - Heredity
- EMTs should take responsibility for correcting their own risk factors.
- EMTs should educate themselves, their colleagues, their families and the community about risk factors and their modification.

A SYSTEMATIC APPROACH TO PATIENT CARE

(S) SUBJECTIVE	History
Symptoms of Ketoacidosis ▪ Polyphagia – excessive food intake ▪ Polydipsia – intense thirst ▪ Polyuria – excessive urination ▪ Vomiting, abdominal pain ▪ Flu-like symptoms, nausea ▪ Insufficient insulin dosage ▪ Gradual onset ▪ Normal activity level ▪ Infection common	**Hypoglycemia** ▪ Excessive food intake ▪ Rapid onset ▪ Normal to excessive activity level ▪ Absent thirst ▪ Intense hunger ▪ Headache

(O) OBJECTIVE	Physical Exam
Symptoms of Ketoacidosis ▪ Altered level of consciousness ▪ Warm and dry skin ▪ Hypotension ▪ Blood sugar level elevated ▪ Rapid weak pulse ▪ Reduced circulation in extremities ▪ Vomiting ▪ Sweet, fruity breath ▪ Kussmaul breathing (deep & rapid) ▪ Measurement of blood sugar ∗ > 200 mild hyperglycemia ∗ > 300 without symptoms moderate hyperglycemia ∗ > 300 or symptoms in any level, severe hyperglycemia	**Hypoglycemia** ▪ Irritability, confusion, seizures or coma ▪ Pale, moist skin ▪ Normal or rapid breathing ▪ Normal or rapid full pulse ▪ Sweating ▪ Measurement of blood sugar < 80

(A) ASSESSMENT

Impression

- A summary of the EMT's impression about the patient's condition.
- The severity of the condition.
- Identification of ALS and BLS criteria.

ALS Indicators	BLS indicators
▪ Unconscious ▪ Unable to swallow ▪ Patient unable to protect airway ▪ Hypotenstion ▪ Failure to respond to oral glucose ▪ Suspected diabetic ketoacidosis	▪ Normal or mild reduction in level of consciousness ▪ Swallowing ability intact ▪ Normal vital signs ▪ Patient can protect airway ▪ Symptoms of hypoglycemia relieved by oral glucose ▪ Hyperglycemia with normal vital signs

(P) PLAN

Treatment

BLS CARE

- **Request paramedics if indicated.**
- Provide supplemental oxygen and/or ventilatory assistance as necessary.
- If hypoglycemic and gag intact; position upright and give oral glucose.
- If hypoglycemic, ability to swallow absent, position on side, give oxygen, ventilation and await paramedics.
- Maintain normal body temperature.
- Monitor vital signs in response to sugar.
- If improves with oral glucose, instruct patient to eat and observe them eating.
- If hyperglycemic without symptoms and blood sugar > 200 (mild or moderate hyperglycemia), contact private physician by patient or BLS.
- If hyperglycemic with symptoms or blood sugar > 300 (severe hyperglycemia), BLS transport to emergency room.

If in doubt and swallowing ability is intact, position upright and give oral glucose.

TRANSPORT DECISIONS

Standard criteria for:

- **Leave At Scene**
  Plus: Patient with hypoglycemia who has responded to oral glucose may be left at scene
- **Privately Owned Vehicle (POV)**
  Except: Patient with hyperglycemia or hypoglycemia should not drive self
- **BLS Aid Car/Private Ambulance**
- **ALS**

DESTINATION DECISIONS

Standard criteria for:

- **Self-Care**
  Plus: Patient with hypoglycemia who has responded to oral glucose may provide self-care and be left at scene
- **Clinic Or Doctor's Office**
- **Hospital Emergency Room**

CASE STUDIES

CASE 1: Hypoglycemia

Subjective

42 y/o female who is well known to the fire service as an insulin dependant diabetic. The local EMT's have treated this patient a number of times over the past three month for both hyper and hypoglycemia. The EMT's know the patient to be overweight, insulin dependent and to have failing eyesight.

Objective

Upon arrival the patient is found supine on the couch, arousable, with slurred speech. Patient has a patent airway and is able to swallow. A Glucometer is found beside the couch with a reading of 60.

Assessment

This patient most likely has:

1. Insulin dependent diabetes, Type II
2. Insulin dependent diabetes, Type I
3. Hypoglycemia
4. Hyperglycemia
5. Diabetic retinopathy

Plan

BLS care should include:

1. ALS request
2. Assist with oral glucose
3. Oxygen treatment
4. Position of comfort
5. Recovery position
6. After full recovery with glucose, BLS transport to ER
7. After full recovery with glucose, Leave at scene

CASE 2: Hypoglycemia, unable to swallow

Subjective

911 is called by a 53 y/o male because he is feeling weak and thinks his diabetes is out of control . On arrival the patient's wife answers the door and is very excited. She tells you the patient is not responding to her.

Objective

Patient found supine on bed, unconscious, with saliva coming from the corner of his mouth. Vital signs are BP 146/80, HR 94, Resp 30. Lung sounds are normal.

Assessment

This patient most likely has:

1. Insulin dependent diabetes, Type II
2. Insulin dependent diabetes, Type I
3. Hypoglycemia

4. Hyperglycemia
5. Diabetic retinopathy

Plan

BLS care should include:

1. ALS request
2. Assist with oral glucose
3. Oxygen treatment
4. Position of comfort
5. Recovery position
6. After full recovery with glucose, BLS transport to ER
7. After full recovery with glucose, Leave at scene

CASE 3: Hyperglycemia With Early Symptoms Of DKA

Subjective

911 is called by a 53 y/o male because he is feeling weak and thinks his diabetes is out of control . On arrival the patient's son answers the door and shows you to the patient who is supine in bed. He responds to your questions and complains of feeling weak and dizzy. In the past few days he has been urinating more frequently. His blood sugar has been running between 200 and 400, in spite of increasing his insulin by 5 units. His current blood sugar is 450.

Objective

His vital signs are BP 104/60, Hr 100, Resp 30. Patient is alert A&OX3, but appears ill. Skin and mucous membranes are dry. Lung sounds are clear.

Assessment

This patient most likely has:

1. Insulin dependent diabetes, Type II
2. Insulin dependent diabetes, Type I
3. Hypoglycemia
4. Hyperglycemia
5. Diabetic retinopathy

Plan

BLS care should include:

1. ALS request
2. Assist with oral glucose
3. Oxygen treatment
4. Position of comfort
5. Recovery position
6. ALS transport to ER
7. After full recovery with glucose, BLS transport to ER
8. After full recovery with glucose, Leave at scene

CASE 4: Hyperglycemia Without Symptoms Of DKA

Subjective

54 y/o female called 911 because of not feeling well, concern about her diabetes, and elevated sugar levels on her Glucometer. She has a history of diet and oral controlled diabetes for over 10 years. Her doctor recently started her on a new blood pressure medicine called lisinopril. Today her fasting blood sugar is 150.

Objective

Her examination is unremarkable.

Assessment

This patient most likely has:

1. Insulin dependent diabetes, Type II
2. Insulin dependent diabetes, Type I
3. Hypoglycemia
4. Hyperglycemia
5. Diabetic retinopathy

Plan

BLS care should include:

1. ALS request
2. Assist with oral glucose
3. Oxygen treatment
4. Position of comfort
5. Recovery position
6. ALS transport to ER
7. After full recovery with glucose, BLS transport to ER
8. After full recovery with glucose, Leave at scene
9. Leave at scene, urge consultation with her physician

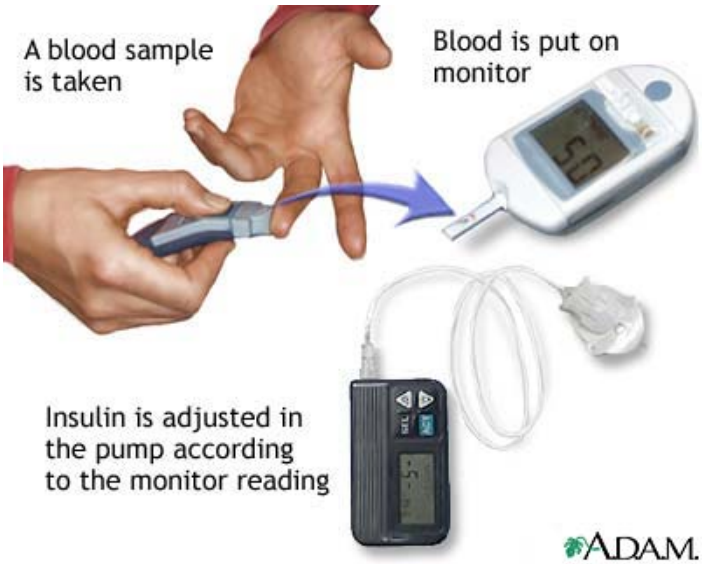
PART II – MASTERY LEVEL

WHAT'S NEW IN THE MONITORING OF DIABETES?

A few years ago a very important study was published dealing with Type I diabetics, the DCCT Study. For the first time it was proven without a doubt that the higher the average blood sugar that a diabetic had, the sooner and the more severe were the eye, kidney and nerve complications from his or her disease. At the same time, if you have diabetes and take very good care of yourself, it really pays off. It had already been shown that if you were a pregnant diabetic it made a huge difference in the health and outcome of the baby depending on how well the mother controlled her blood sugar. Studies have now been extended to show that tight blood sugar control for Type II diabetes also makes a huge difference. Because of all this, the treatment for diabetes has changed a lot in the last few years.

There are two excellent ways for diabetics to now monitor their blood sugars. ***Chemstrips*** and ***blood glucose meters*** are great inventions. With a poke of the finger and a drop of blood one can get a very accurate minute-to-minute measure of their own blood sugar. With the development of relatively cheap meters Chemstrips are easy to read. A diabetic can now monitor blood sugar before meals, at bedtime, and any time he/she is ill or feels peculiar.

The other relatively new method that allows diabetics to monitor their diabetes is the ***glycohemoglobin*** or Hbalc test. I call this test the "diabetic's report card" test. Glucose combines with all kinds of proteins in our bodies. The higher the concentration of glucose the more it combines with different proteins. Glycohemoglobins is the complex of glucose with hemoglobin-the oxygen carrying protein in red blood cells. If a person has a high average blood sugar all the time, then that person develops a high level of glycohemoglobin. It is now known that a diabetic needs to keep his glycohemoglobin down around 7.5 or lower (depending on the lab performing the test) if he wants to minimize his chances of developing the complications of diabetes. A value of 7.5 is roughly equivalent to an average blood sugar of 140-145. It is hard for a diabetic to maintain this level; however, a well-trained and motivated person can do it very well. There is also research in the use of a watch style glucose monitor. This would work much the same way as the pulse oximeter.



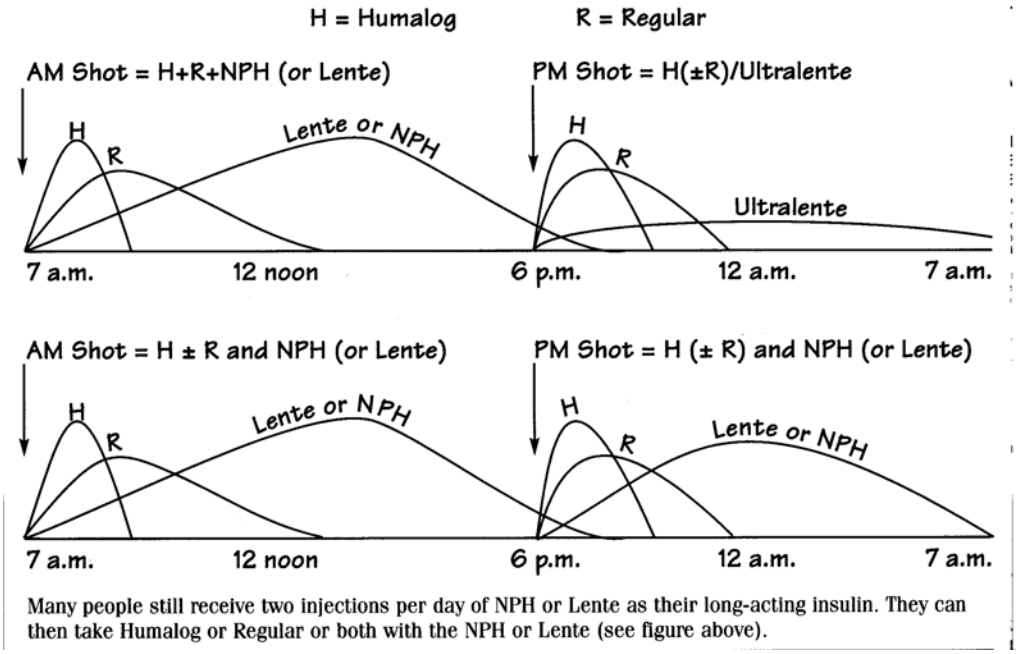
Most diabetics have to be very careful about their diet. Not only is what they eat important but also when they eat. Type I diabetics have no choice but to take insulin unless they get a Pancreas transplant. Artificially manufactured insulin keeps changing and getting better. Most people now are using genetically engineered human insulin and have to take two or more injections daily. Most Type I diabetics should take 3 or 4 injections daily.

Humalog is a new very rapid acting and potent insulin, which came out within the last 2 years. A great many Type I diabetics will be taking this at mealtime, some using a 'pen' which looks like an oversized

ball-point pen that they carry with them. Many Type I diabetics also will take an injection of Human N or L insulin at bedtime.

Type II diabetics have more options to treat their diabetes. Their goal also is to keep their average blood sugar 145 or less. They too need to be on a diabetic diet. Most are also overweight and need to restrict their calories. Since cardiovascular disease and hyperlipidemia are so common in diabetics many patients have to be very careful about their fat intake as well.

In years past most diabetics took agents called sulfonylureas. These are agents that among other things stimulate the already overstressed beta cells of the pancreas to release still more insulin. These agents include glyburide sold under the brand names DiaBeta, Micronase and Glynase.
Another is glipizide, which is sold under several different names including Glucotrol. There are older sulfonylureas still around like tolazamide (Tolinase), Tolbutamide (Orinase), chlorpropamide (Diabinese) and acetohexamide (Dymerlor). Another new drug is out which is essentially a sulfonylureas - Amaryl. Still another new drug for Type II diabetics is repaglinide (Prandin).



Many people still receive two injections per day of NPH or Lente as their long-acting insulin. They can then take Humalog or Regular or both with the NPH or Lente (see figure above).

Below is a general approximation, derived form data furnished by several insulin manufactures.

Insulin	Start	Peak	End
Short Acting:			
Humalog	10 min.	1 hr.	4 hr.
Regular	30 min	2-5 hr.	8 hr
Long Acting:			
NPH	1.5 hr	4-12 hr.	22 hr.
Ultralente	4 hr.	8-18 hr.	30 hr.
Pre-Mixed Insulin's:			
Lente	2.5 hr.	6-16 hr.	24 hr.
70/30 NPH/ Reg.	30 min.	2-12 hr.	24 hr.
50/50	30 min.	2-6 hr.	24 hr.

What is important about all these agents that stimulate the release of insulin, is that when they make patients hypoglycemic, the medication stays in their system for hours to days, The patients may get hypoglycemic again soon after they have been treated. Therefore, these patients should be strongly encouraged to seek further medical evaluation and treatment at a hospital.

Many Type II diabetics are now being treated with m*etformin* (*Glucophage®)*. This agent does not cause hypoglycemia. It helps reduce insulin resistance and is often given together with a sulfonylureas or insulin itself. Many Type II diabetics take 1000mg of Glucophage® twice daily and a single injection of Humalin N insulin at bedtime. Like all medications, metformin has its side effects. It causes a lot of gastrointestinal upset and can cause toxicity in sick patients. Lactic acidosis can be a life threatening illness from Glucophage®; fortunately, this side effect is quite rare. The last new group of medications for Type II diabetics is the glitazones. *Troglitazone (Rezuline®*) or came out last year and got a bad rap because of reported liver toxicity. *Rosiglitazone* (*Avandia®*) is a new first cousin and several weeks ago *pioglitazone* (Actos®) came on the market. This whole group has effects on the body and particularly the liver to improve insulin sensitivity.

A number of Type II diabetics who formerly required insulin injections to keep their blood sugar levels under control have been able "to go off the needle" since starting Rezulin or Avandia. This is going to be a very important new class of drugs for diabetics. Besides liver toxicity with Rezulin all of them can cause fluid retention. In some patients with weak hearts, they can easily cause pulmonary edema. Thankfully, there have been tremendous developments in medical engineering which aid in the treatment of diabetes. One such development, is the insulin pump. An insulin pump is small, safe, and with proper training, easy to use. Patients are able to manage diabetes with an insulin pump, allowing them to lead quite normal lives.

The goal of insulin pump therapy is to mimic what normally happens physiologically. The pump is worn outside the body on a belt, in a pocket or in a pouch. It is about the size and weight of a pager and is battery powered.

DIABETES UPDATE

Diabetes mellitus can cause changes in a patient's blood vessels and nerves leading to medical problems. The large blood vessels may become narrow and slow the flow of blood. When blood flow is slowed, it increases the risk of heart disease and stroke, because the vessels become obstructed easier. Small blood vessels may become damaged, too. Damage to small blood vessels in the eyes can affect vision and can lead to blindness. The blood vessels in the kidneys may also be affected. This can lead to kidney disease.

Another common complication of diabetes is nerve damage. The diabetic may experience numbness, burning, or tingling, especially the feet and legs. This condition can also impair the function of internal organs such as the stomach, intestines, and bladder. Loss of feeling is why heating pads and other sources of heat can easily injure people with diabetes.

The diabetic is susceptible to urinary infections when the bladder is affected by nerve damage. Signs and symptoms include cloudy or bloody urine, painful urination, low back pain, and fever. Diabetics sometimes take drugs to relieve faintness, stomach trouble, or diarrhea caused by nerve damage.

The combination of nerve damage and blood vessel disease can lead to amputation. Loss of feeling in the feet may result in blisters and ulcers increasing the chances of infection. In addition, blood vessel damage can make infections hard to heal. Serious infection may require amputation to save the limb and arrest the infection.

RESOURCES & REFERENCES

- King County Emergency Medical Services Basic Life Support Patient Care Guidelines 2002
- American Academy of Orthopedic Surgeons, Emergency Care and Transportation of the Sick and Injured, 8th Edition

Web sites:

http://www.atdiabetessymptoms.com/

http://www.diabetesinc.org/indexa.htm

http://www.ispad.org/

http://www.ispad.org/

http://www.joslinresearch.org/homedir/home.htm

http://www.washington.edu/

http://www.metrokc.gov/health/medicone/system.htm

http://www.metrokc.gov/health/ems/training.htm

KING COUNTY EMERGENCY MEDICAL SERVICES

RECERTIFICATION

SKILLS CHECKLIST

CBT 450 DIABETIC EMERGENCIES

EMT NAME & #	PLEASE PRINT NAME	DATE	

Goal: Early recognition, meaningful treatment, and safe rapid transport to the appropriate facility.

Objective: Given a partner, relevant equipment and a patient with a diabetes emergency treatment as specifically identified in the BLS county protocols.

SCENE SIZE-UP

☐ Scene Safety	☐ Body Substance Isolation	☐ Additional Resources

INITIAL ASSESSMENT

☐ Level of Consciousness	☐ Airway	☐ Breathing	☐ Circulation and C-Spine Precaution	☐ Bleeding

SUBJECTIVE (FOCUSED HISTORY)

- ☐ Reassured and tried to calm patient
- ☐ Found out patient's chief complaint (**SAMPLE & OPQRST**)
- ☐ Record patient's medicines
- ☐ Found out about Mechanism of Injury

OBJECTIVE (FOCUSED PHYSICAL EXAM)

- ☐ Recorded and documented baseline vital signs (HR, BP, Skin Vitals)
- ☐ Exposed and examined injury for location and severity
- ☐ Checked swallowing ability if decreased LOC
- ☐ Checked and assessed GCS
- ☐ Obtained recent glucometer reading
- ☐ Followed up with second set of vital signs

ASSESSMENT (IMPRESSION)

- ☐ Stated suspicions (hypoglycemia, hyperglycemia or DKA)
- ☐ Considered severity and need for ALS intervention (intubation, IV's or medication)

PLAN (TREATMENT)

- ☐ Requested medics as indicated
- ☐ Maintain airway
- ☐ Assisted conscious patient with oral glucose
- ☐ Administered oxygen appropriately (nasal cannula, non-rebreather mask or bag valve mask)
- ☐ Kept patient warm
- ☐ Re-evaluated vital signs in response to sugar
- ☐ Observed additional oral intake if responded to glucose
- ☐ Reviewed patient's usual treatment for hyperglycemia
- ☐ Position patient appropriately (upright)
- ☐ Prepare patient for transport if needed

COMMUNICATION

- ☐ Delivered short radio report within 60 seconds

DOCUMENTATION

- ☐ Completed SOAP narrative portion of Medical Incident Report Form

RECERTIFY	YES?	NO?	EVALUATOR	PLEASE PRINT NAME AND SIGN